

APPENDIX 8.1C

Modeling Protocol

December 30, 2002



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Mr. Leland Villalvazo
Technical Services Division
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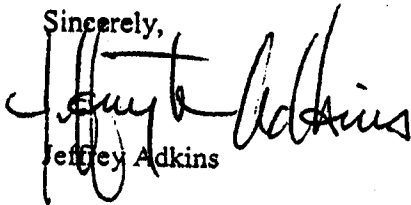
Subject: Modeling Protocol for the Modesto Irrigation District's
Electric Generating Station in Ripon, California

Dear Mr. Villalvazo:

Please find attached the emissions modeling protocol for the Modesto Irrigation District's ("MID") proposed Electric Generating Station ("MEGS") project to be located in Ripon, California. MID will be applying to the District for an Authority to Construct and a Determination of Compliance for this new 100-megawatt simple cycle power generating facility configured using two natural-gas-fired combustion turbines. The MEGS facility will be a new major source of NOx emissions pursuant to District Regulation 2201, "New and Modified Stationary Source Review Rule," and will be subject to District requirements for air quality modeling analyses. Attached for your review and approval is a description of the analytical approach that will be used to comply with District modeling requirements for the project. We intend to file a permit application with the District in February 2003 and are requesting approval of the modeling protocol by January 20, 2003.

We would be pleased to meet with you and your staff to discuss this protocol if such a meeting would be useful. We look forward to working with you. If you have any questions, please do not hesitate to call me at (916) 444-6666. Thank you for your attention in this matter.

Sincerely,



Jeffrey Adkins

cc: Steve Hill, MID
Jim Swaney, SJVUAPCD, Northern Region
Susan Strachan
John Carrier, CH2M Hill

**Modesto Irrigation District
MID Electric Generating Station
Modeling Protocol
(December 2002)**

Modesto Irrigation District (MID) is planning to construct two new combustion turbines at a site in Ripon, California. The proposed project, called the MID Electric Generating Station, will consist of two General Electric LM6000 gas turbines, with a total nominal net generating capacity of 98 MW. The project will also include two small cooling towers for auxiliary cooling. The proposed project will be a new major source under San Joaquin Valley Unified Air Pollution Control District (SJVUAPCD) regulations.

The applicant will submit air quality impact analyses to both the SJVUAPCD and the California Energy Commission (CEC). The modeling analyses will include pollutants as required by SJVUAPCD Rule 2201, section 4.3.2, and the CEC requirements for evaluation of project air quality impacts. The purpose of this document is to establish the procedure for meeting the SJVUAPCD and CEC air quality modeling requirements for the proposed project.

The project is expected to result in emissions that will exceed the SJVUAPCD major source threshold of 25 tons per year for oxides of nitrogen (NO_x). Emissions of carbon monoxide (CO), volatile organic compounds (VOCs), sulfur dioxide (SO₂), and fine particulates (PM₁₀) are expected to be below the major source levels. The project will also trigger CEC modeling requirements for cumulative and construction-based impacts.

The project is also expected to be below the 100-ton per year major source threshold for federal Prevention of Significant Deterioration (PSD) requirements (40 CFR 52.21). However, as part of the CEC modeling requirements, the permit application will include a demonstration of compliance with many of the PSD requirements.

This modeling protocol outlines the proposed use of air dispersion modeling techniques that will be used to assess impacts from the proposed source, and has been prepared by Sierra Research on behalf of MID. This protocol also follows modeling guidance provided by the U.S. Environmental Protection Agency (USEPA) in its "*Guideline on Air Quality Models*" (including supplements), the National Park Service's "*Permit Application Guidance for New Air Pollution Sources*" (Bunyak, 1993), the Federal Land Managers' "*Air Quality Related Values Workgroup (FLAG) Phase I Report*" (December 2000), the "*Interagency Workgroup on Air Quality Modeling (IWAQM) Phase II Recommendations*" (1998), and the National Park Service's "*Guidance on Nitrogen Deposition Thresholds*" (2001) .

PROJECT LOCATION

The proposed project is located near the intersection of South Stockton Avenue and West 5th Street in Ripon, California. The UTM coordinates of the site are approximately 4177.7 kilometers northing, 665.4 kilometers easting (NAD 27, Zone 10). The nominal site elevation is 62 feet above mean sea level.

PROPOSED EMISSION SOURCES

The primary emission sources at the MID facility will be the two gas turbine electric generators. The turbines will be fired with natural gas only. The turbines will utilize advanced combustion designs and emission controls to limit emissions of NO_x to 2.5 ppmc at full load and emissions of CO to 6 ppmc. Emissions of PM₁₀ and SO₂ will be kept to a minimum through the exclusive use of natural gas. The particulate emissions from the cooling towers will be minimized with the use of high-efficiency drift eliminators.

EXISTING METEOROLOGICAL DATA

The Stockton Airport and Modesto Airport meteorological monitoring stations are both first-order National Weather Service (NWS) stations located near the project site. Both stations measure and record surface data (e.g., wind speed, direction, cloud cover, ceiling height, and temperature) on a continual basis. The Stockton monitoring location is about 20 km northwest of the project site (37 degrees 54 minutes North latitude and 121 degrees 15 minutes West longitude; UTMN 4195.2, UTME 654.5), and the Modesto monitoring station is located approximately 19 km southeast of the project site (37 degrees 38 minutes North latitude and 120 degrees 58 minutes West longitude; UTMN 4166.3, UTME 679.6). Currently the SJVUAPCD has approved a 1976 meteorological data set for the Stockton Airport station and a 1999 data set for the Modesto Airport station. Both data sets have been processed for use in the ISCST3 dispersion model.

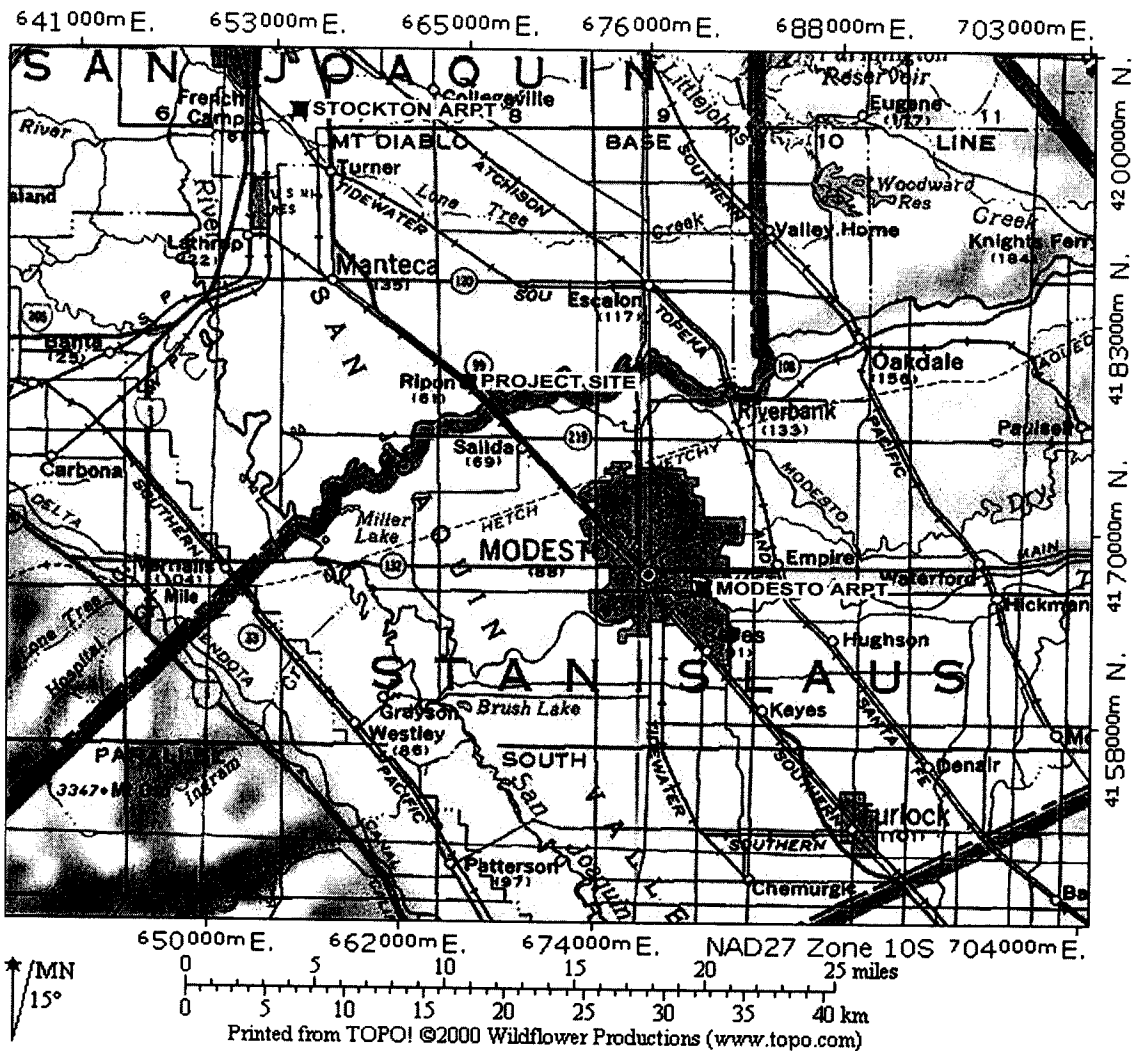
Other meteorological data are available for the area as well. Air quality monitoring stations maintained by the California Air Resources Board (CARB), or by local air pollution control districts such as SJVUAPCD or Bay Area Air Quality Management District (BAAQMD), collect hourly wind speed, wind direction, and temperature data, as well as ambient pollutant concentration levels. These air quality monitoring stations with meteorological monitoring capability are located at Modesto (15 km away from the project site), Stockton (27 km), Tracy (36 km), Turlock (37 km), and Bethel Island (55 km). The Tracy and Bethel Island monitoring stations are situated at the western edge of the San Joaquin Valley; the Stockton and Modesto NWS sites, as well as the other stations, are closer to the center of the Valley. All sites are at the same approximate elevation, with similar solar exposures.

Meteorological data stations operated by the California Department of Water Resources (DWR) California Irrigation Management System (CIMIS) are also available in the area for supplemental met data. There is a CIMIS station at Modesto (11 km), as well as others at

Manteca (14 km), Patterson (33 km), Merced (80 km), Kesterson (81 km), and Los Banos (87 km). However, since CIMIS wind data are gathered at a 2-meter height, and not at a 10-meter height as is usually favored for air quality dispersion modeling purposes, CIMIS data are generally not used.

Terrain immediately surrounding the facility and the Stockton and Modesto Airport monitoring stations is presented in Figure 1. The area in the immediate vicinity of the project site and monitoring station is relatively flat.

Figure 1
Site Location



With respect to large-scale features, the project site and the monitoring stations are all located in the San Joaquin Valley. The San Joaquin Valley is quite broad and is generally oriented north to south. Airflow in the valley can be characterized by up-valley and down-valley winds. The down-valley winds are generally a result of airflow into the Valley from the Carquinez Strait and the Altamont Pass that then flow south. Strong diurnal wind regimes markedly affect the horizontal transport of air in the project area. There is a pronounced west-northwest component to the wind rose for the Stockton Airport monitoring station (Figure 2), which becomes more northwesterly for the Modesto Airport monitoring station (Figure 3). Note that calms appear to be more frequent for Modesto: Modesto is farther inland than Stockton.

Morning and afternoon mixing heights for the Stockton and Modesto Airport sites can be determined from interpolating quarterly mixing heights for Stockton from the quarterly isopleths given in guidance (*"Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution Throughout the Contiguous United States,"* George C. Holzworth, January, 1972).

EXISTING AMBIENT AIR QUALITY DATA

Background ambient air quality data for the project area are available from the following monitoring sites.

TABLE 1 AMBIENT BACKGROUND AIR QUALITY MONITORING STATIONS MID ELECTRIC GENERATING STATION		
Monitoring Location	Distance from Project Site	Pollutants Monitored
Modesto – 14 th Street	15 km	Ozone [1981-2002], CO [1981-2002], NO ₂ [1981-2002], SO ₂ [1981-1989], PM ₁₀ [1996-2002], PM _{2.5} [1999-2002]
Stockton – Hazelton Street	27 km	Ozone [1976-2002], CO [1963-2002], NO ₂ [1963-2002], SO ₂ [1980-1989], PM ₁₀ [1986-2002], PM _{2.5} [1999-2002]
Turlock – South Minaret Street	37 km	Ozone [1992-2002], CO [1992-2002], NO ₂ [1992-2002], PM ₁₀ [1993-2002]
Bethel Island	55 km	Ozone [1981-2002], CO [1981-2002], NO ₂ [1980-2002], SO ₂ [1980-2002], PM ₁₀ [1986-2002], PM _{2.5} [1999-2002]
Bakersfield – 5558 California Avenue	323 km	Ozone [1994-2002], CO [1994-2002], NO ₂ [1994-2002], SO ₂ [1994-2002], PM ₁₀ [1994-2002], PM _{2.5} [1999-2002]

Figure 2

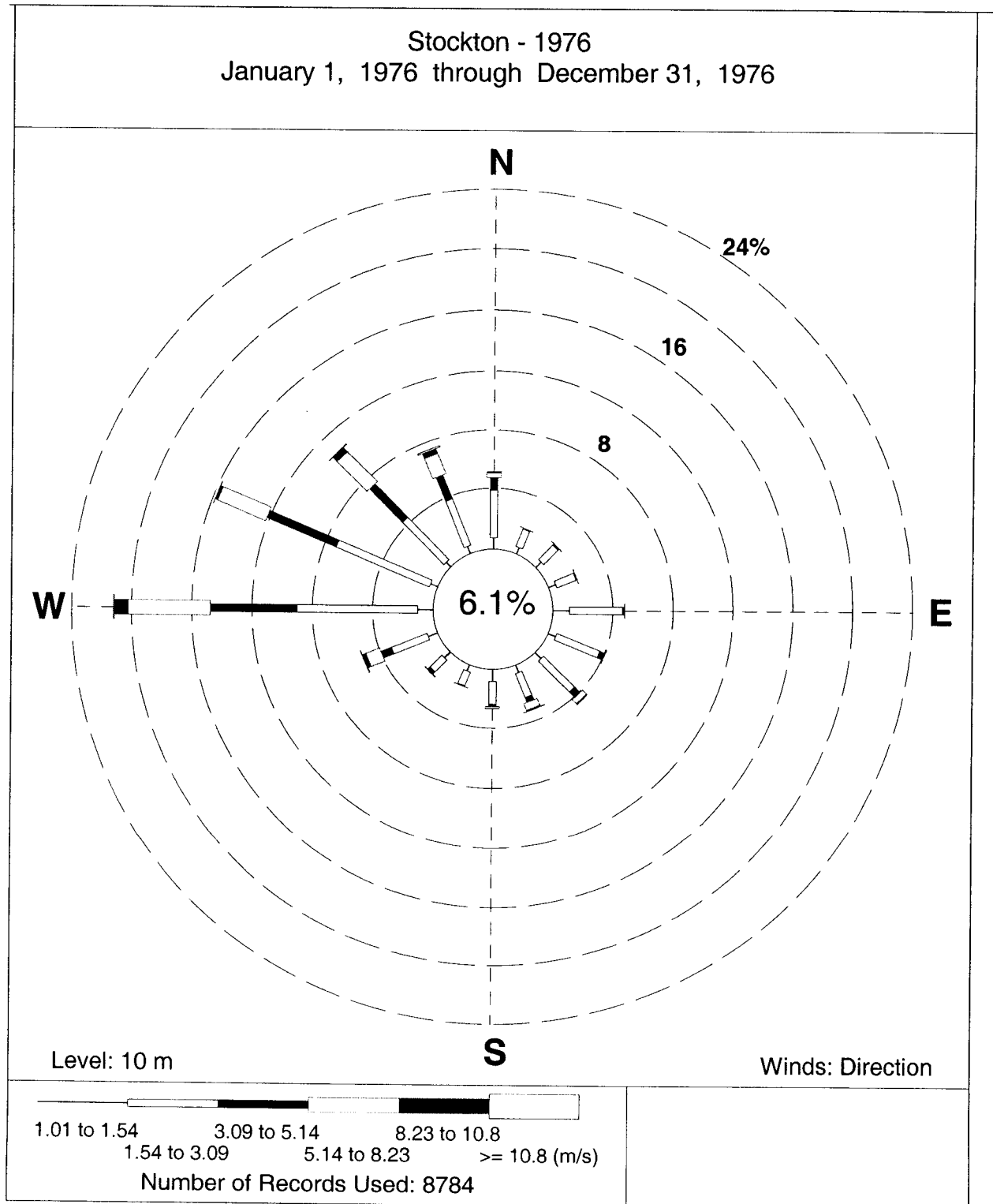
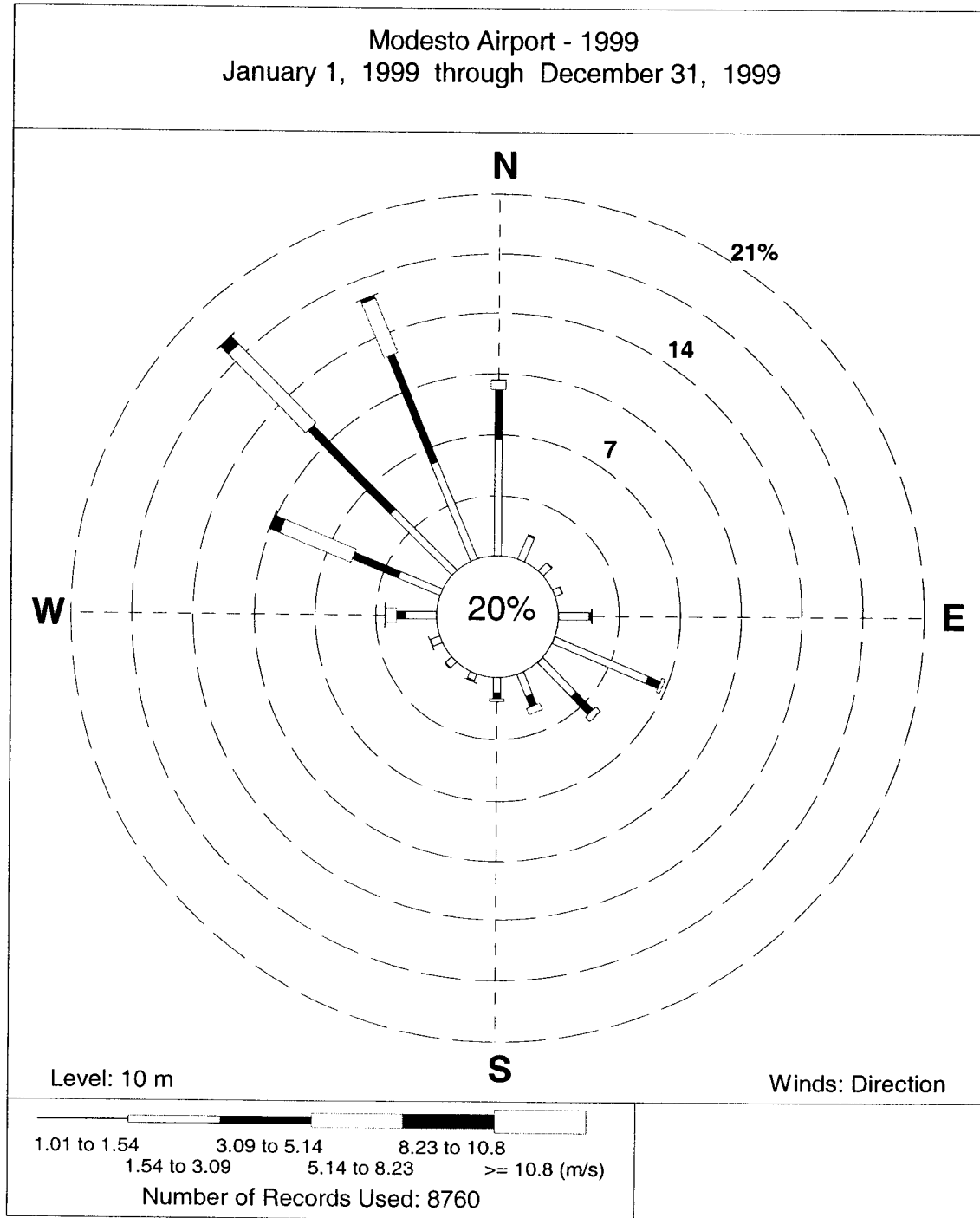


Figure 3



SITE REPRESENTATION – METEOROLOGICAL DATA

USEPA defines the term “on-site data” to mean data that would be representative of atmospheric dispersion conditions at the source and at locations where the source may have a significant impact on air quality. Specifically, the meteorological data requirement originates in the Clean Air Act at Section 165(e)(1), which requires an analysis “of the ambient air quality at the proposed site and in areas which may be affected by emissions from such facility for each pollutant subject to regulation under [the Act] which will be emitted from such facility.”

This requirement and USEPA’s guidance on the use of on-site monitoring data are also outlined in the “*On-Site Meteorological Program Guidance for Regulatory Modeling Applications*” (1987). The representativeness of the data is dependent upon (a) the proximity of the meteorological monitoring site to the area under consideration, (b) the complexity of the topography of the area, (c) the exposure of the meteorological sensors, and (d) the period of time during which the data are collected. As discussed below, we believe the meteorological data from the Modesto Airport are representative of conditions at the MID project site.

The wind roses for the Stockton Airport (Figure 2) and Modesto Airport (Figure 3) indicate a fairly consistent diurnal cycle associated with a modified sea breeze passing through the San Joaquin/Sacramento Delta into the San Joaquin Valley (“Delta” breeze). Stockton is breezier than Modesto, however. At Stockton, the occurrence of high wind speeds (defined here as wind speeds greater than 5.14 m/s) is 18.4%, with a predominant wind direction of west and northwest. At Stockton, conditions of D stability, which often signify higher winds, occur 33.5% of the year. At Modesto, the occurrence of similar high wind speeds is 13.2%, with a predominant wind direction of northwest. At Modesto, conditions of D stability occur 20.6% of the year.

Use of the Stockton met data set would tend to maximize impacts due to building downwash, since downwash is a function of high wind speeds and D stability. Use of the Modesto met set would tend to maximize impacts due to low wind speeds. Because the project site is farther removed from the San Joaquin/Sacramento River Delta than the Stockton monitoring site, the winds at the project site are expected to be calmer than at the Stockton site. Therefore, the Modesto met set is expected to be more representative of the project site than the Stockton met set.

The area surrounding the project site can be characterized, for dispersion purposes, as rural. Areas within three (3) kilometers of the project site, while incorporating some developed residential areas, consist mostly of orchards and farming areas. In accordance with the Auer land use classification methodology (USEPA’s “*Guideline on Air Quality Models*”), land use within the area circumscribed by a three km radius around the modified facility is greater than 50 percent rural. Therefore, in the modeling analyses supporting the permitting of the facility, rural dispersion coefficients will be assigned.

Representativeness has also been defined in the “*Workshop on the Representativeness of Meteorological Observations*” (Nappo et. al., 1982) as “the extent to which a set of measurements taken in a space-time domain reflects the actual conditions in the same or different space-time domain taken on a scale appropriate for a specific application.” Judgments of representativeness should be made only when sites are climatologically similar, as the project site and the Modesto Airport NWS station clearly are. Representativeness has also been defined in the PSD Monitoring Guideline as data that characterize the air quality for the general area in which the proposed project would be constructed and operate. The same large-scale topographic features that influence the Modesto Airport monitoring station also influence the proposed project site in the same manner.

In determining the representativeness of the Modesto Airport station data set, relative to the project site, the following considerations were addressed.

Aspect ratio of terrain, which is the ratio of height to width of hill at base

The aspect ratios of the terrain near the Modesto Airport monitoring station would be nearly identical to the terrain near the project site. No large differences were discerned: the terrain is essentially flat at both locations.

Slope of terrain

Terrain in the immediate vicinity of the project site and the Modesto monitoring station is relatively flat.

Ratio of terrain height to stack/plume height

Terrain heights in the hills bordering the San Joaquin Valley, 24 km away at closest approach, range from 200 to 400 meters above stack base. Final plume height for a similar kind of project (stack height plus plume rise) was calculated for D stability and a wind speed of 5 meter/second (m/s) to be about 280 meters. Thus, it is conceivable, though unlikely due to the great distance involved, that some maximum project impacts may occur in complex terrain. Nevertheless, the possibility of complex terrain concentration maxima will be first checked with SCREEN3 modeling, which employs conservative screening meteorology, prior to modeling with ISCST3.

Correlation of terrain features to prevailing meteorological conditions

As discussed in detail earlier, the orientation and aspect of terrain in the project area correlate well with the prevailing wind fields in the Modesto wind rose, with little apparent influence by local terrain perturbations (such as small hill outcroppings or canyon orientations). Wind flow at the Modesto monitoring station would therefore be nearly identical to the project site.

Thus, it is our assessment that the wind direction and wind speed data collected at the Modesto monitoring station are very similar to the dispersion conditions at the project site and to the regional area. The Modesto 1999 wind rose does not indicate any overwhelming effects on the potential dispersion of pollutants from the project site on a regional scale from other influences. Thus, the Modesto 1999 data set would satisfy the definition of representative data.

SITE REPRESENTATION – AMBIENT AIR QUALITY DATA

As shown above on Table 1, the Modesto monitoring station is the closest station to the project site with recently collected air quality data for O₃, NO₂, PM₁₀, and CO. Consequently, with the exception of SO₂ levels, this monitoring station was selected to represent the background ambient levels for the project site. As shown on Table 1, the Modesto monitoring station stopped collecting ambient SO₂ data in 1989. The closest monitoring station to the project site with recently collected SO₂ data is at Bethel Island. The Bethel Island SO₂ data are expected to be conservative for estimating baseline concentrations in the project site, since they are taken from a location closer to large SO₂ emission sources in the Bay Area than is the project site. For state and federal attainment pollutants with maximum modeled ground-level impacts greater than USEPA-defined significance levels, modeled concentrations will be added to these representative background concentrations to determine compliance with the CAAQS and NAAQS.

AIR QUALITY DISPERSION MODELS

Overview

Several USEPA dispersion models are proposed for use to quantify pollutant impacts on the surrounding environment based on the emission sources operating parameters and their locations. The models proposed for use are Building Profile Input Program (BPIP, current version 95086), Industrial Source Complex - Short Term (ISCST3, current version 02035), CTSCREEN (current version 94111), SCREEN3 (current version 96043), and the VISCREEN visibility model (current version 88341). These models, along with options for their use and how they are used, are discussed below.

Simple, Complex, and Intermediate Terrain Impacts

For modeling the project in simple, complex, and intermediate terrain, the ISCST3 model will be used with the hourly meteorological data from the Modesto monitoring station for 1999. The ISCST3 model is a steady-state, multiple-source, Gaussian dispersion model designed for use with stack emission sources situated in terrain where ground elevations can exceed the stack heights of the emission sources. The ISCST3 model requires hourly meteorological data consisting of wind vector, wind speed, temperature, stability class, and mixing height. The model assumes that there is no variability in meteorological parameters over a 1-hour time

period, hence the term steady-state. The ISCST3 model allows input of multiple sources and source groupings, eliminating the need for multiple model runs. Complex phenomena such as building-induced plume downwash are treated in the ISCST3 model.

The ISCST3 model is one of several models that are recommended by the USEPA for such evaluations. The ISCST3 model is capable of calculating pollutant concentrations in intermediate terrain. Intermediate terrain is defined as terrain between stack top and final plume height. In calculating pollutant concentrations in intermediate terrain, the model will select the higher of the simple and complex terrain calculations on an hour-by-hour, source-by-source, and receptor-by-receptor basis. In addition, the ISCST3 model is preferred for this application because it incorporates algorithms for the simulation of aerodynamic downwash induced by buildings. These effects are of importance because many of the emission points may be below Good Engineering Practice (GEP) stack height.

Technical options selected for the ISCST3 model are listed below. Use of these options follows the USEPA's (1986, 1987, 1990, and 1994) modeling guidance and/or sound scientific practice. An explanation of these options and the rationale for their selection is provided below.

- Default option (includes final plume rise except for building wake downwash, stack-tip downwash except for Schulman-Scire [SS] downwash, buoyancy-induced dispersion except for SS downwash, default wind profile exponents, default temperature gradients, and calm processing per EPA policy);
- Anemometer height = 10 meters;
- Rural dispersion parameters; and
- Elevated receptor terrain heights option.

Final plume rise option does not consider the possible effects of gradual plume rise on ambient concentrations during the rising phase of the plume downwind transport. Gradual plume rise is recommended by USEPA (1986, 1987, 1990, 1994) when there is significant terrain close to the stacks. Significant terrain does not occur for many miles from Ripon, however. Buoyancy-induced dispersion, which accounts for the buoyant growth of a plume caused by entrainment of ambient air, will be included because of the relatively warm exit temperature and subsequent buoyant nature of the exhaust plumes. Stack-tip downwash, which adjusts the effective stack height downward following the methods of Briggs (1972) for cases where the stack exit velocity is less than 1.5 times the wind speed at stack top, will be selected per USEPA guidance.

As previously mentioned, based on the land use classification procedure of Auer (1978), land use within the area circumscribed by a three-km radius around the modified facility is greater than 50 percent rural. Therefore, in the modeling analyses supporting the permitting of the facility, rural coefficients will be assigned.

The calm processing option allows the user to direct the program to exclude hours with persistent calm winds in the calculation of concentrations for each averaging period. This option is generally recommended by the USEPA (1986, 1987, 1990, 1994) for regulatory applications. The ISCST3 model recognizes a calm wind condition as a wind speed less than or equal to 1 meter per second and a wind direction equal to that of the previous hour (a wind speed of 0 m/sec is used in the ASCII meteorological data file). The calm processing option in the ISCST3 model will then exclude these hours from the calculation of concentrations.

CTSCREEN Dispersion Model

If the ISCST3 model calculates exceedances of AAQS, increments, or significance levels in intermediate or complex terrain (not considered likely here), the CTSCREEN model will be used to refine the modeling analysis. The CTSCREEN model, the screening mode of CTDMPPLUS, is a refined point source Gaussian air quality model for use in all stability conditions for complex terrain applications. Because the model accounts for the dimensional nature of the plume and terrain interaction, the model requires digitized terrain of the nearby topographical features. The mathematical representation of terrain is accomplished by the terrain preprocessors, FITCON and HCRIT. The wind direction used in CTSCREEN is based on the source-terrain geometry, resulting in computation of the highest impacts likely to occur. Other meteorological variables are chosen from possible combinations from a set of predetermined values. CTSCREEN provides maximum concentration estimates that are similar to, but on the conservative side of, those that would be calculated from the CTDMPPLUS model with a full year of on-site meteorological data.

As well as calculating maximum 1-hour concentrations at all receptors, the CTSCREEN model is designed to provide conservative estimates of worst-case 3-hour, 24-hour, and annual impacts. Scaling factors are used to convert calculated 1-hour concentrations to 3-hour, 24-hour, and annual estimates. A workgroup study found the ratios to convert 1-hour concentrations to 3-hour, 24-hour, and annual concentrations to be 0.7, 0.15, and 0.03, respectively.

CTSCREEN is appropriate for the following applications:

- Elevated point sources;
- Terrain elevations above stack top;
- Rural areas; and
- One-hour to annual averaging time periods.

Ambient Ratio Method and Ozone Limiting Method

Annual NO₂ concentrations will be calculated using the Ambient Ratio Method (ARM), adopted in Supplement C to the Guideline on Air Quality Models (USEPA, 1994). The Guideline allows a nationwide default conversion rate of 75% for annual NO₂/NO_x ratios.

Should NO₂ concentrations need to be examined in a more rigorous manner, the Ozone Limiting Method (OLM) will be used. Contemporaneous hourly ozone data collected at the Modesto monitoring station during 1999 are proposed for use in the Ozone Limiting Method to calculate hourly NO₂ concentrations from hourly NO_x concentrations. The Ozone Limiting Method involves an initial comparison of the estimated maximum NO_x concentration and the ambient O₃ concentration to determine which is the limiting factor to NO₂ formation. If the O₃ concentration is greater than the maximum NO_x concentration, total conversion is assumed. If the NO_x concentration is greater than the O₃ concentration, the formation of NO₂ is limited by the ambient O₃ concentration. In this case, the NO₂ concentration is set equal to the O₃ concentration plus a correction factor that accounts for in-stack and near-stack thermal conversion.

EPA's ISC-OLM model will be used to calculate the NO₂ concentration based upon the OLM method.

Fumigation

The SCREEN3 model will be used to evaluate fumigation impacts for all short-term averaging periods (24 hours or less). The methodology in EPA 454/R-92-019 (Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised) will be followed for this analysis. Combined impacts for all sources under fumigation conditions will be evaluated, based on USEPA and any applicable SJVUAPCD modeling guidelines.

GOOD ENGINEERING PRACTICE STACK HEIGHT AND DOWNWASH

ISCST3 can account for building downwash effects on dispersing plumes. Stack locations and heights and building locations and dimensions will be input to BPIP. The first part of BPIP determines and reports on whether a stack is being subjected to wake effects from a structure or structures. The second part calculates direction-dependent "equivalent building dimensions" if a stack is being influenced by structure wake effects. The BPIP output is formatted for use in ISCST3 input files. The proprietary Bowman Engineering version of BPIP, called BEE-BPIP, will be used.

RECEPTOR SELECTION

Receptor and source base elevations will be determined from USGS Digital Elevation Model (DEM) data using the 7½-minute format (i.e., 30-meter spacing between grid nodes). All coordinates will be referenced to UTM North American Datum 1927 (NAD27), zone 10. The ISCST3 receptor elevations will be interpolated amongst the DEM nodes.

Cartesian coordinate receptor grids will be used to provide adequate spatial coverage surrounding the project area for assessing ground-level pollution concentrations, to identify the extent of significant impacts, and to identify maximum impact locations. A 250-meter resolution

coarse receptor grid will be developed and will extend outwards at least 10 km (or more as necessary to calculate the significant impact area).

For the full impact analyses, a nested grid will be developed to fully represent the maximum impact area(s). This grid will have 25-meter resolution along the facility fenceline, in three tiers of receptors along the fenceline, out to 75 meters from the fenceline, and 250-meter spacing out to as far as 10 km from the site. When maximum or maximum second-highest impacts occur in the 250 meter spaced area, additional refined receptor grids with 30-meter resolution will be placed around the maximum coarse grid impacts and extended out 900 meters in all directions. Concentrations within the facility fenceline will not be calculated.

MODELING SCENARIOS

Pollutant emissions to the atmosphere from the proposed facility will occur from combustion of natural gas in combustion turbines and from particulate emissions from the cooling towers. Emission rates will be provided by MID and will be based on vendor data and additional conservative assumptions of equipment performance. Turbine emissions and stack parameters, such as flow rate and exit temperature, exhibit some variation with ambient temperature and operating load. In order to calculate the worst-case air quality impacts, a screening analysis will be performed to evaluate each operating scenario (based on operating load and atmospheric conditions) to predict the worst-case facility configuration on a pollutant-specific basis.

In the modeling analysis, maximum impacts will be predicted for maximum (100%) and reduced load conditions. In addition, different ambient temperatures will be evaluated for each load condition. Each of these conditions has unique performance characteristics that affect plume dispersion and thus predicted impacts. This analysis is most relevant to analyses for short-term impacts. Annual impacts will be evaluated based on expected turbine performance at an ambient temperature representative of the project site. The temperatures and humidity levels selected for the short-term screening analyses will closely reflect the range of possible site conditions. The results of this screening analysis will be used to select the worst-case operational scenarios for the modeling analyses in order to provide maximum operating flexibility. Refined modeling for the permit application will be based on these worst-case scenarios.

The screening modeling will use one complete year of meteorological data and the nested receptor grid described above to determine the worst-case source configuration (i.e., configuration that produces maximum facility impacts). This worst-case source configuration will then be executed with all available meteorological data (here, one complete year of 1999 Modesto met data) and, if necessary, coarse grid impacts will be refined with fine grid receptors spaced 30 meters apart.

Ambient Air Quality Impact Analyses

In evaluating the impacts of the proposed project on ambient air quality, we will model the ambient impacts of the project, add those impacts to background concentrations, and compare the results to the state and federal ambient standards for SO₂, NO₂, PM₁₀, and CO.

In accordance with EPA guidance (40 CFR part 51, Appendix W, Sections 11.2.3.2 and 11.2.3.3), the highest modeled concentration will be used to demonstrate compliance with annual standards, while the highest second-highest modeled concentrations will be used to demonstrate compliance with standards based on averaging periods of 24 hours or less.

Additional Analyses Required by the CEC

Additional analyses that may be required by the CEC are a cumulative air quality impacts analysis and an analysis of construction impacts. The procedures to be used in evaluating construction impacts are discussed below. A separate protocol will be prepared for the cumulative impacts analysis.

Construction Impacts Analysis - The potential ambient impacts from air pollutant emissions during the construction of the MID Electric Generating Station will be evaluated by air quality modeling that will account for the construction site location and the surrounding topography; the sources of emissions during construction, including vehicle and equipment exhaust emissions; and fugitive dust.

Site Description - The dispersion modeling analyses will include a description of the physical setting of the facility and surrounding terrain. A map showing the plant location, fence lines, and model receptors will be included, as well as a plot plan of the plant site indicating heights of nearby structures above a common reference point.

Types of Emission Sources - Construction of the proposed MID Electric Generating Station will be divided into three main construction phases: (1) site preparation; (2) construction of foundations; and (3) installation and assembly of mechanical and electrical equipment. The construction impacts analysis will include a schedule for construction operation activities. Site preparation is expected to include site excavation, excavation of footings and foundations, and backfilling operations. After site preparation is finished, the construction of the foundations will begin. Once the foundations are finished, the installation and assembly of the mechanical and electrical equipment will begin.

Fugitive dust emissions from the construction of the project result from (1) dust entrained during excavation and grading at the construction site; (2) dust entrained during onsite travel on paved and unpaved roads and across the unpaved construction site; (3) dust entrained during aggregate and soil loading and unloading operations; (4) dust entrained from raw material transfer to and from material stockpiles; and (5) wind erosion of areas disturbed during construction activities.

Heavy equipment exhaust emissions result from (1) exhaust from the heavy equipment used for excavation, grading, and construction of onsite structures; (2) exhaust from a water truck used to control construction dust emissions; (3) exhaust from Diesel welding machines, gasoline-powered generators, air compressors, and water pumps; and (4) exhaust from gasoline-powered pickup trucks and Diesel flatbed trucks used onsite to transport workers and materials around the construction site. Diesel and gasoline truck exhaust emissions will result from transport of mechanical and electrical equipment to the project site and transport of rubble and debris from the site to an appropriate landfill. Diesel exhaust emissions may also result from transport of raw materials to and from stockpiles.

Emissions from a worst-case day will be calculated for each of the three main construction phases and only the phase with the highest emissions will be used to model short-term impacts (24 hours or less). The annual average equipment schedule (equipment mix and operating levels) will be used to calculate annual average emission levels during the construction phase of the project. These annual emission levels will be used to model annual average construction impacts.

Existing Ambient Levels - Ambient NO₂, SO₂, CO, and PM₁₀ concentrations are monitored at two locations in the vicinity of the proposed site: Modesto and Bethel Island. These sites are believed to be representative of the site and are being proposed for use in the analysis.

Model Type - The EPA-approved ISCST3 model will be used to estimate ambient impacts from construction emissions. The modeling options and meteorological data described above will be used for the modeling analysis.

The construction site will be represented as an area source in the modeling analysis. Emissions will be divided into two categories: exhaust emissions and dust emissions. For exhaust emissions, a plume height of 4.15 meters (13.5 feet) will be used. Plume height refers to the distance measured from ground level to the centerline of the emissions plume. For dust emissions, a release height of 0.5 meters will be used due to the ambient plume temperatures and negligible plume velocities.

For the construction modeling analysis, the receptor grid will begin at the property boundary and will extend approximately one kilometer in all directions. Receptor spacing will be 60 meters, except for three tiers of receptors spaced along the project boundary at 25-meter spacing.

FINAL MODELING SUBMITTAL

In accordance with SJVUAPCD modeling guidance, the final modeling analyses will also include the following materials:

- US Geological Survey (USGS) 7½-minute (1:24,000) map(s) showing the facility;
- Completed “*Air Quality Modeling Checklist*”;
- Modeling summaries of maximum impacts for each air quality model showing meteorological conditions and receptor location and elevation;
- All modeling outputs (including BPIP and meteorological files) on diskette, together with a description of all filenames;
- Plot plan showing emission points, nearby buildings (including dimensions), cross-section lines, property lines, fencelines, roads, and UTM coordinates; and
- Table showing the building identifiers in the BPIP run(s) and plot plan.

REFERENCES

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